

IN THE CLAIMS

1. (Currently Amended) An extended coverage sidewall automatic fire sprinkler comprising:

a generally tubular body with a central passageway and a central axis, one end of the passageway forming an outlet at one end of the tubular body,

a closure at the one end of the tubular body at least essentially generally closing the passageway,

a trigger positioned to releasably retain the closure at the outlet closing the passageway, and

a deflector at a discharge end of the sprinkler, the deflector being coupled with the tubular body facing and spaced axially away from the outlet and intersecting the central axis, the tubular body having a K factor greater than 9, the deflector being symmetrical about [[a]] an imaginary vertical plane passing through the central axis, the deflector including a first arm, a second arm and a generally planar face portion generally orthogonal to the central axis the face portion having an opening consisting of a circular opening axially aligned with the center axis and engaged with a portion of the body to space the face portion from the outlet, the face portion having an upper face portion and a lower face portion, the upper and lower face portions deflector being further divided by [[a]] an imaginary horizontal plane passing through the central axis and orthogonal to the vertical plane, the upper face portion further including an upper edge above the horizontal plane and a[, the]] lower edge face portion being further defined by a peripheral edge of the face portion, the peripheral edge defining the lower face portion including a first linear portion that extends parallel to the vertical plane and a second linear portion that extends parallel to and below the horizontal plane perpendicular to the vertical plane, the face portion having a bottom center extending below the horizontal plane and first and second linear

~~portions being orthogonal to one another so as to define a centralized lower face portion centrally axially aligned along the vertical plane and below the horizontal plane with the circular opening so as to locate the lower edge as a portion of the deflector most remotely below the horizontal plane,~~ the deflector further including a canopy portion spaced from the upper edge of the upper face portion ~~such that the upper face portion has so as to define~~ a single opening in the deflector ~~for fluid to pass through between the canopy portion and the upper edge, the single opening being located above the horizontal plane,~~ the canopy portion being supported by the first and second ~~[[arm]]~~ arms and being coupled to the face portion at a first canopy end and extending generally along the central axis away from the outlet towards a free end, the first canopy end being spaced at a first distance from the outlet, the free end defining a linear profile the entire length from the first arm to the second arm extending parallel to the horizontal plane and spaced from the outlet at a second distance greater than the first distance, and the deflector being shaped and positioned so that upon release of the closure by the trigger, the deflector transforms water discharged horizontally from the outlet into a spray pattern of water droplets dispersed over a generally horizontal, generally rectangularly-shaped extended coverage area of more than one hundred square feet located on one side of the sprinkler effective to control an ordinary hazard fire in the coverage area, and when the sidewall fire sprinkler is paired with an identical sidewall fire sprinkler mounted approximately sixteen feet apart on a generally planar wall surface with a collection area of approximately sixteen feet between the sprinklers and sixteen feet away from one of the sprinklers, the collection area located at either one of a distance of about thirty-six inches and a distance of approximately six feet and 7.5 inches below each of the sidewall fire sprinklers so that water is delivered to the collection area at an average density of about 0.15 gallons per minute per square feet.

2. (Original) The sprinkler of claim 1, wherein the tubular body has a K factor of between 10 and 13, both inclusive.
3. (Original) The sprinkler of claim 2, wherein the K factor is between 11 and 12, both inclusive.
4. (Original) The sprinkler of claim 1, wherein the trigger is a liquid-filled glass bulb.
5. (Previously Presented) The sprinkler of claim 1, wherein the generally rectangular shaped coverage area receiving water from said sidewall sprinkler is up to about two hundred and fifty six square feet in size.
6. (Previously Presented) The sprinkler of claim 5, wherein the generally rectangularly shaped coverage area receiving water from said sidewall sprinkler is up to about three hundred and twenty square feet in size.
7. (Previously Presented) The sprinkler of claim 1, wherein the generally rectangularly shaped coverage area is more than three hundred and twenty and up to about three hundred eighty four square feet in size.
8. (Previously Presented) The sprinkler of claim 7, wherein the generally rectangularly shaped coverage area is about three hundred and eighty-four square feet in size.
9. (Previously Presented) The sprinkler of claim 1, wherein the coverage area is at least sixteen feet by sixteen feet and up to about sixteen feet by twenty four feet.

10. (Previously Presented) The sprinkler of claim 9, wherein the coverage area is about sixteen feet by eighteen feet in size.

11. (Previously Presented) The sprinkler of claim 10, wherein the coverage area is about sixteen feet by twenty feet in size.

12. and 13. (Canceled)

14. (Currently Amended) The sprinkler of claim 1, wherein the face portion is positioned facing and spaced axially away from the outlet along the central axis so as to perpendicularly intersect the column of water issuing from the outlet along the central axis and the canopy portion being supported on one side of the face portion spanning the face portion, the canopy portion being generally parallel with the central axis and perpendicular to the face portion, the face portion and canopy portion being configured to deliver water to the coverage area in a density of at least 0.15 and up to about 0.20 gallons per minute/ft² to achieve a generally planar spray pattern of water droplets generally parallel to a major side of the canopy portion facing the central axis, the spray pattern extending up to about twenty feet beyond the face portion and up to about eight feet to either lateral side of the central axis when the sprinkler is positioned with the central axis horizontal and the major side of the canopy portion facing the central longitudinal axis being generally horizontal and above the central longitudinal axis whereby said ceiling sprinkler is effective in controlling ordinary hazard fires over an extended coverage area of more than one hundred square feet and up to about three hundred eighty four square feet when pressurized to supply water at a rate of between about 0.15 and about 0.20 gallons per minute/ft² times the size of the coverage area in square feet.

15. (Previously Presented) The sprinkler of claim 14, wherein the coverage area is at least three hundred and twenty square feet and up to about three hundred eighty four square feet.

16. – 19. (Canceled)

20. (Currently Amended) A sidewall automatic fire sprinkler comprising:

a generally tubular body with a central passageway and a central axis, one end of the passageway forming an outlet at one end of the tubular body, the tubular body having a K factor greater than $9 \text{ gpm}/(\text{psi})^{1/2}$, the body having a knuckle spaced from the outlet,

a closure at one end of the tubular body closing the passageway,

a thermally responsive trigger positioned to releasably retain the closure at the outlet closing the passageway before activation of the trigger by heat, and

a deflector at a discharge end of the sprinkler, the deflector being coupled with the tubular body facing and spaced axially away from the outlet, the deflector being symmetrical about an imaginary vertical plane and divided by an imaginary horizontal plane that is orthogonal to the vertical plane, so as to intersect the central axis defining the intersection between the vertical and horizontal planes, the deflector having a first arm, a second arm and a generally planar face portion oriented generally perpendicularly with respect to the central axis and located on one lateral side of the central axis and , the face portion having an opening consisting of a circular opening engaged with the knuckle to support the face portion spaced from the outlet, the face portion having an upper edge located above the horizontal plane and a lower edge located below the horizontal plane extending parallel to the horizontal plane and perpendicular to the vertical plane, the face portion having a bottom center extending below the horizontal plane centrally axially aligned with the circular opening along the vertical plane so as

to locate the lower edge as a portion of the deflector most remotely below the horizontal plane,
the deflector further including a canopy portion supported by the first and second arms of the
deflector spaced from the upper edge and oriented generally parallel to the central axis ~~and being~~
~~located on another lateral side of the central axis opposite the one lateral side,~~ the canopy portion
being coupled to the face portion at a first canopy end ~~[[and]]~~ so as to define a single opening of
the deflector through which water can pass, the canopy extending generally along the axis away
from the outlet towards a free end, the first canopy end being spaced at a first distance from the
outlet, the free end defining a linear profile extending the entire length from the first arm to the
second arm parallel to the horizontal plane and spaced from the outlet at a second distance
greater than the first distance, the deflector further being configured, with the sprinkler in a
normal operating orientation with the central axis generally horizontal and the canopy portion
generally centered over the face portion, so that after activation of the sprinkler, the deflector
transforms water discharged through the outlet of the sprinkler substantially uniformly over a
coverage area generally rectangular in shape, the coverage area being more than one-hundred
square feet in size and being located generally symmetrically with respect to the central axis, the
coverage area extending from the deflector in a direction away from the orifice, and when the
sidewall fire sprinkler is paired with an identical sidewall fire sprinkler mounted approximately
sixteen feet apart on a generally planar wall surface with a collection area of approximately
sixteen feet between the sprinklers and sixteen feet away from one of the sprinklers, the
collection area located at either one of a distance of about thirty-six inches and a distance of
approximately six feet and 7.5 inches below each of the sidewall fire sprinklers so that water is
delivered to the collection area at an average density about 0.15 gallons per minute per square
feet.

21. (Previously Presented) The sidewall automatic fire sprinkler of claim 20 wherein the deflector is further configured, with the sprinkler in the normal orientation with the canopy portion generally horizontal and above the face portion of the deflector, to deliver after release of the closure, water supplied through the tubular body at a rate of at least 0.15 and up to about 0.20 gallons per minute per square foot for each square foot of the coverage area, sufficiently uniformly over the coverage area to control an ordinary hazard fire located anywhere within the coverage area with only the supplied water, with the coverage area being more than one hundred square feet and up to about three hundred eighty four square feet and located at a height of only three feet below the canopy portion of the deflector.

22. (Previously Presented) The sidewall automatic fire sprinkler of claim 21 wherein the coverage area is up to sixteen feet wide and at least sixteen and up to about twenty four feet long.

23. (Previously Presented) The sidewall automatic fire sprinkler of claim 22 wherein the coverage area is about sixteen feet wide and more than sixteen and up to about twenty-four feet long.

24. (Currently Amended) An extended coverage sidewall automatic fire sprinkler comprising:

- a generally tubular body with a central passageway being disposed along a central axis and forming an outlet at an end of the generally tubular body, the central passageway having a K factor greater than 9 and up to about 14;

- a closure located at the end of the generally tubular body;

- a trigger positioned to releasably retain the closure to occlude the outlet;

two frame arms coupled to the generally tubular body proximate the outlet, the two frame arms being located on a plane which intersects the central axis to define a knuckle;

a deflector being coupled with the tubular body by the two frame arms along the central axis and spaced axially away from the outlet so that upon release of the closure by the trigger, the deflector transforms water discharged horizontally from the outlet into a spray pattern of water droplets dispersed over a generally horizontal, generally rectangularly-shaped extended coverage area of at least two hundred fifty-six and up to about three-hundred eighty four square feet on one side of the sprinkler in an amount and with a distribution effective to control an ordinary hazard fire in the coverage area; and

wherein the deflector is symmetrical about an imaginary vertical plane and divided by an imaginary horizontal plane that is orthogonal to the vertical plane, the central axis defining the intersection between the vertical and horizontal planes, the deflector includes a first arm, a second arm and a generally planar face portion oriented generally perpendicular with respect to the central axis, the face portion having an opening consisting of a single-flow-opening circular opening engaged with the knuckle to support the face portion spaced from the outlet, the face portion having an upper edge located above the horizontal plane and a lower edge located below the horizontal plane and extending parallel to the horizontal plane and perpendicular to the vertical plane, the face portion having a bottom center extending below the horizontal plane centrally axially aligned with the circular opening along the vertical plane so as to locate the lower edge as a portion of the deflector most remotely below the horizontal plane, the deflector further including a canopy portion oriented generally parallel to the central axis, the canopy portion having a free end defining a linear profile extending the entire length between the first arm and the second arm parallel to the horizontal plane, the canopy further having a generally

flat planar surface substantially parallel to the plane on which the frame arms are located, the first and second arms of the deflector coupling the canopy [[and]] to the face portion spaced from the upper edge, to define [[the]] a single flow opening through the face portion of the deflector, and when the sidewall fire sprinkler is paired with an identical sidewall fire sprinkler mounted approximately sixteen feet apart on a generally planar wall surface with a collection area of approximately sixteen feet between the sprinklers and sixteen feet away from one of the sprinklers the collection area located at either one of a distance of about thirty-six inches and a distance of approximately six feet and 7.5 inches below each of the sidewall fire sprinklers so that water is delivered to the collection area at an average density of about 0.15 gallons per minute per square feet.

25. (Currently Amended) An extended coverage sidewall automatic fire sprinkler comprising:

- a generally tubular body with a passageway being disposed along an axis and forming an outlet at an end of the generally tubular body, the passageway having a K factor greater than 9 and up to about 14, where the K factor represents a flow of fluid in gallons per minute through the passageway divided by the square root of the pressure of fluid fed to the generally tubular body in pounds per square inch gauge;

- a closure proximate the end of the generally tubular body;

- a trigger that retains the closure to occlude the outlet until actuation of the trigger;

and

- a deflector being coupled with the tubular body and spaced axially away from the outlet, the deflector being symmetrical about an imaginary vertical plane and divided by an imaginary horizontal plane that is orthogonal to the vertical plane, the axis defining the

intersection between the vertical and horizontal planes, the deflector further including a first arm, a second arm and a face portion oriented generally perpendicular with respect to the axis, the face portion having an opening consisting of a circular opening coupled to the body to support the face portion spaced from the outlet, the face portion having an upper edge located above the horizontal plane and a lower edge located below the horizontal plane extending parallel to the horizontal plane and perpendicular to the vertical plane, the face portion having a bottom center extending below the horizontal plane centrally axially aligned with the circular opening along the vertical plane so as to locate the lower edge as a portion of the deflector most remotely below the horizontal plane generally planar face, the deflector further including a canopy portion supported by the first and second arm spaced from the upper edge and oriented generally parallel to the axis so as to define a single opening of the deflector through which water can pass, the canopy portion having a free end defining a linear profile extending the entire length between the first arm and the second arm parallel to the horizontal plane, the canopy further having a surface distal to the outlet consisting of a generally flat surface generally perpendicular to [[a]] the vertical plane passing through the axis, and when the sidewall fire sprinkler is paired with an identical sidewall fire sprinkler mounted approximately sixteen feet apart on a generally planar wall surface with a collection area of approximately sixteen feet between the sprinklers and sixteen feet away from one of the sprinklers, the collection area located at either one of a distance of about thirty-six inches and a distance of approximately six feet and 7.5 inches below each of the sidewall fire sprinklers so that water is delivered to the collection area at an average density of about 0.15 gallons per minute per square feet.

26. (Currently Amended) The sprinkler of claim 25, ~~further including two frame arms being coupled to the generally tubular body and the deflector proximate the outlet, wherein the two frame arms being located on a~~ and their plane are parallel to an area to be protected, ~~the plane intersecting the axis.~~

27. (Previously Presented) The sprinkler of claim 25, wherein the first and second arms of the deflector couple the flat canopy and the face portion of the deflector.

28. (Currently Amended) The sprinkler of claim 25, wherein the first and second arms of the deflector ~~couple the flat canopy and the face portion of the deflector, the first and second arms defining a frame~~ the single flow opening through the deflector.

29. (Currently Amended) The sprinkler of claim 25, wherein the first and second arms of the deflector ~~couple the flat canopy and the face portion of the deflector, the first and second arms being~~ are spaced apart by about 1.5 inches.

30. (Previously Presented) The sprinkler of claim 25, wherein the deflector transforms water flow fed into the inlet and being discharged horizontally from the outlet, upon release of the closure by the trigger, over an extended-coverage area on one side of the tubular body in an amount and with a distribution effective to control a fire in the extended-coverage area.

31. (Currently Amended) The sprinkler of claim 30, wherein the canopy portion comprises a distal surface ~~generally parallel to the longitudinal axis above an area to be protected, the distal surface consisting of a generally flat surface disposed on the plane, the plane being oriented in one orientation generally parallel to or oblique to the axis~~ and the horizontal plane.

32. (Previously Presented) The sprinkler of claim 30, wherein the amount of water being discharged is at a density of at least 0.15 and up to about 0.20 gallons per minute per square feet.
33. (Previously Presented) The sprinkler of claim 32, wherein the amount of water being discharged is at a density of about 0.20 gallons per minute per square feet.
34. (Previously Presented) The sprinkler of claim 33, wherein the extended-coverage area is greater than 100 square feet and up to about 384 square feet.
35. (Previously Presented) The sprinkler of claim 33, wherein the water flow from the outlet is at least 38 gallons per minute and up to about 48 gallons per minute.
36. (Previously Presented) The sprinkler of claim 33, wherein the extended-coverage area including a length and a width, each of the length and the width being greater than 10 feet and up to about 24 feet.
37. (Previously Presented) The sprinkler of claim 36, wherein the extended coverage including a length and a width, one of the length and the width being at least 16 feet and up to about 24 feet such that the extended-coverage area is at least 256 square feet and up to about 384 square feet.
38. (Previously Presented) The sprinkler of claim 37, wherein the extended-coverage area is at least 320 and up to about 384 square feet.
39. (Previously Presented) The sprinkler of claim 33, wherein the K factor is about 11 or greater.
40. (Previously Presented) The sprinkler of claim 39, wherein the K factor is about 14.

41. (Previously Presented) The horizontal sprinkler of claim 31, wherein the canopy portion including a generally rectangular shaped perimeter having a length along the axis of about 1.1 inches or more and a width orthogonal to the axis of about 1.5 inches or more.

42. (Currently Amended) An extended coverage, horizontal sidewall automatic fire sprinkler comprising:

a generally tubular body with a passageway disposed along an axis, one end of the passageway forming an outlet at one end of the tubular body, the tubular body having a K factor greater than 9, where the K factor represents a flow of fluid in gallons per minute through the passageway divided by the square root of the pressure of fluid fed to the generally tubular body in pounds per square inch gauge;

a closure positioned proximate the outlet so as to occlude the passageway;

a trigger that retains the closure at the outlet until actuation of the trigger; and

a deflector being coupled to the tubular body and spaced from the outlet, the deflector transforming water being discharged horizontally from the outlet, upon release of the closure by actuation of the trigger, at a density of at least 0.15 gallons per minute per square feet, the deflector being symmetrical about an imaginary vertical plane and divided by an imaginary horizontal plane that is orthogonal to the vertical plane, the central axis defining the intersection between the vertical and horizontal planes, the deflector having a first arm, a second arm and a generally planar face portion generally orthogonal to the axis[[and]], the face portion having an opening consisting of a circular opening coupled to the body to support the face portion spaced from the outlet, the face portion having an upper edge located above the horizontal plane and a lower edge located below the horizontal plane extending parallel to the horizontal plane and

perpendicular to the vertical plane, the face portion having a bottom center extending below the horizontal plane centrally axially aligned with the circular opening along the vertical plane so as to locate the lower edge as a portion of the deflector most remotely below the horizontal plane, the deflector further including a canopy portion being spaced from the upper edge and coupled to the face portion at a first canopy end [[and]] to define a single opening of the deflector for water to pass through, the canopy portion extending generally along the axis away from the outlet towards a free end, the first canopy end being spaced at a first distance from the outlet, the free end defining a linear profile extending the entire length from the first arm to the second arm parallel to the horizontal plane and spaced from the outlet at a second distance greater than the first distance, and when the sidewall fire sprinkler is paired with an identical sidewall fire sprinkler mounted approximately sixteen feet apart on a generally planar wall surface with a collection area of approximately sixteen feet between the sprinklers and sixteen feet away from one of the sprinklers, the collection area located at either one of a distance of about thirty-six inches and a distance of approximately six feet and 7.5 inches below each of the sidewall fire sprinklers so that water is delivered to the collection area at an average density of about 0.15 gallons per minute per square feet.

43. (Previously Presented) The sprinkler of claim 42, wherein the deflector transforms water being discharged from the outlet so as to provide a density of about 0.20 gallons per minute per square feet.

44. (Previously Presented) The sprinkler of claim 43, wherein the deflector transforms water being discharged from the outlet at a rate of at least 38 gallons per minute and up to about 48 gallons per minute.

45. (Previously Presented) An extended coverage, horizontal sidewall automatic fire sprinkler comprising:

a generally tubular body defining a passageway along an axis and forming an outlet at an end of the generally tubular body, the passageway having a K factor greater than 9 and up to about 14, where the K factor represents a flow of fluid in gallons per minute through the passageway divided by the square root of the pressure of fluid fed to the generally tubular body in pounds per square inch gauge;

a frame arm being coupled to the end of the generally tubular body, the frame arm being located generally on a horizontal plane, which is generally parallel to an area to be protected;

a closure proximate the end of the generally tubular body;

a heat responsive trigger that retains the closure to occlude the passageway until actuation of the trigger; and

a deflector assembly being symmetrical about an imaginary vertical plane and divided by an imaginary horizontal plane that is orthogonal to the vertical plane, the axis defining the intersection between the vertical and horizontal planes, the deflector assembly having a first arm, a second arm and a generally planar face portion generally orthogonal to the axis, the face portion having an opening consisting of a circular opening engaged with the frame arm to support the face portion spaced from the outlet, the face portion having an upper edge located above the horizontal plane and a lower edge located below the horizontal plane extending parallel to the horizontal plane and perpendicular to the vertical plane, the face portion having a bottom center extending below the horizontal plane centrally axially aligned with the circular opening along the vertical plane so as to locate the lower edge as a portion of the deflector most

remotely below the horizontal plane, the deflector assembly further including a canopy portion supported by the first and second arms spaced from the upper edge and being coupled to [[a]] the face portion at a first canopy end [[and]] to define a single opening of the deflector for water to pass through, the canopy portion extending generally along the axis away from the outlet towards a free end, the first canopy end being spaced at a first distance from the outlet, the free end defining a linear profile extending the entire length from the first arm to the second arm parallel to the horizontal plane and spaced from the outlet at a second distance greater than the first distance, the deflector assembly being coupled to the generally tubular body by the frame arm so as to be spaced from the outlet along the axis so that when the heat responsive trigger is actuated, the closure is positioned to allow a flow of fluid to issue horizontally from the outlet of the generally tubular body over an extended-coverage area, and when the sidewall fire sprinkler is paired with an identical sidewall fire sprinkler mounted approximately sixteen feet apart on a generally planar wall surface with a collection area of approximately sixteen feet between the sprinklers and sixteen feet away from one of the sprinklers, the collection area located at either one of a distance of about thirty-six inches and a distance of approximately six feet and 7.5 inches below each of the sidewall fire sprinklers so that water is delivered to the collection area at an average density of about 0.15 gallons per minute per square feet.

46. (Currently Amended) An extended coverage, horizontal sidewall automatic fire sprinkler comprising:

a generally tubular body defining a passageway along an axis and forming an outlet at an end of the generally tubular body, the passageway having a K factor greater than 9 and up to about 14, where the K factor represents a flow of fluid in gallons per minute through

the passageway divided by the square root of the pressure of fluid fed to the generally tubular body in pounds per square inch gauge;

a frame arm being coupled to the end of the generally tubular body, the frame arm being located generally on a vertical plane, which is generally perpendicular to an area to be protected;

a closure proximate the end of the generally tubular body;

a heat responsive trigger that retains the closure to occlude the passageway until actuation of the trigger; and

a deflector assembly being symmetrical about an imaginary vertical plane and divided by an imaginary horizontal plane that is orthogonal to the vertical plane, the axis defining the intersection between the vertical and horizontal planes, the deflector assembly coupled to the generally tubular body by the frame arm so as to be spaced from the outlet along the axis so that when the heat responsive trigger is actuated, the closure is positioned to allow a flow of fluid to issue horizontally from the outlet of the generally tubular body over an extended-coverage area, the deflector having a first arm, a second arm and a generally planar face portion extending generally orthogonal to the axis, the face portion having an opening consisting of a circular opening engaged with the frame arm to support the face portion spaced from the outlet, the face portion having an upper edge located above the horizontal plane and a lower edge located below the horizontal plane extending parallel to the horizontal plane and perpendicular to the vertical plane, the face portion having a bottom center extending below the horizontal plane centrally axially aligned with the circular opening along the vertical plane so as to locate the lower edge as a portion of the deflector most remotely below the horizontal plane, the deflector assembly further including a canopy portion spaced from the upper edge to define a single

opening of the deflector assembly for water to pass through, the canopy portion having a free end defining a linear profile extending the entire length between the first and second arms parallel to the horizontal plane, the canopy further having a surface distal to the outlet and generally parallel to the longitudinal axis above an area to be protected, the distal surface consisting of a generally flat surface generally perpendicular to ~~[[a]]~~ the vertical plane passing through the longitudinal axis, the canopy portion being coupled to the face portion by the first and second arms of the deflector assembly, and when the sidewall fire sprinkler is paired with an identical sidewall fire sprinkler mounted approximately sixteen feet apart on a generally planar wall surface with a collection area of approximately sixteen feet between the sprinklers and sixteen feet away from one of the sprinklers, the collection area located at either one of a distance of about thirty-six inches and a distance of approximately six feet and 7.5 inches below each of the sidewall fire sprinklers so that water is delivered to the collection area at an average density of about 0.15 gallons per minute per square feet.

47. (Currently Amended) An extended coverage, horizontal sidewall automatic fire sprinkler comprising:

- a generally tubular body defining a passageway along an axis, the passageway having a K factor greater than 9 and up to about 14, where the K factor represents a flow of fluid in gallons per minute through the passageway divided by the square root of the pressure of fluid fed to the generally tubular body in pounds per square inch gauge;

- a closure proximate the end of the generally tubular body;

- a heat responsive trigger that retains the closure to occlude the passageway until actuation of the trigger; and

a deflector being symmetrical about an imaginary vertical plane and divided by an imaginary horizontal plane that is orthogonal to the vertical plane, the axis defining the intersection between the vertical and horizontal planes, the deflector assembly coupled to the tubular body and spaced from the outlet, the deflector transforming water being discharged horizontally from the outlet, upon release of the closure by actuation of the trigger, over a generally horizontal extended coverage area so as to control a fire in the coverage area, the deflector having a first arm, a second arm and a generally planar face portion extending generally orthogonal to the axis, the face portion having an opening consisting of a ~~single flow~~ single circular opening coupled to the body to support the face portion spaced from the outlet, the face portion having an upper edge located above the horizontal plane and a lower edge located below the horizontal plane extending parallel to the horizontal plane and perpendicular to the vertical plane, the face portion having a bottom center extending below the horizontal plane centrally axially aligned with the circular opening along the vertical plane so as to locate the lower edge as a portion of the deflector most remotely below the horizontal plane, the deflector assembly including a canopy portion being spaced from the upper edge and coupled to the face portion by the first and second arms defining the so as to define a single flow opening of the deflector for water to pass through therebetween, the canopy portion having a free end defining a linear profile extending the entire length between the first arm and the second end arm parallel to the horizontal plane, and when the sidewall fire sprinkler is paired with an identical sidewall fire sprinkler mounted approximately sixteen feet apart on a generally planar wall surface with a collection area of approximately sixteen feet between the sprinklers and sixteen feet away from one of the sprinklers, the collection area located at either one of a distance of about thirty-six inches and a distance of approximately six feet and 7.5 inches below each of the sidewall fire

sprinklers so that water is delivered to the collection area at an average density of about 0.15 gallons per minute per square feet.

48. (Currently Amended) An extended coverage, horizontal sidewall automatic fire sprinkler comprising:

a generally tubular body defining a passageway along an axis, the passageway having a K factor greater than 9 and up to about 14, where the K factor represents a flow of fluid in gallons per minute through the passageway divided by the square root of the pressure of fluid fed to the generally tubular body in pounds per square inch gauge;

a closure positioned proximate the outlet so as to occlude the passageway;

a heat responsive trigger that retains the closure to occlude the passageway until actuation of the trigger; and

a deflector being symmetrical about an imaginary vertical plane and divided by an imaginary horizontal plane that is orthogonal to the vertical plane, the axis defining the intersection between the vertical and horizontal planes, the deflector being coupled to the tubular body and spaced from the outlet, the deflector transforming water being discharged horizontally from the outlet upon release of the closure by actuation of the trigger over a generally horizontal extended coverage area so as to control a fire in the coverage area, the deflector having a first arm, a second arm and a generally planar face portion extending generally orthogonal to the axis, the face portion having an opening consisting of a circular opening coupled to the body to support the face portion spaced from the outlet, the face portion having an upper edge located above the horizontal plane and a lower edge located below the horizontal plane extending parallel to the horizontal plane and perpendicular to the vertical plane, the face portion having a

bottom center extending below the horizontal plane centrally axially aligned with the circular opening along the vertical plane so as to locate the lower edge as a portion of the deflector most remotely below the horizontal plane, the deflector assembly further including a canopy portion spaced from the upper edge to define a single opening of the deflector for water to pass through, the canopy portion having a free end defining a linear profile extending the entire length between the first and second arms parallel to the horizontal plane, the face portion consisting of a single flow opening, the canopy portion being coupled to the face portion by the first and second arms symmetrical to the axis, the first and second arms of the deflector defining the single flow opening having a distance of about 1.5 inches between proximal surfaces of the first and second arms, and when the sidewall fire sprinkler is paired with an identical sidewall fire sprinkler mounted approximately sixteen feet apart on a generally planar wall surface with a collection area of approximately sixteen feet between the sprinklers and sixteen feet away from one of the sprinklers, the collection area located at either one of a distance of about thirty-six inches and a distance of approximately six feet and 7.5 inches below each of the sidewall fire sprinklers so that water is delivered to the collection area at an average density of about 0.15 gallons per minute per square feet.

49. (Previously Presented) The sprinkler according to claim 45, wherein the deflector transforms water at a rate of at least 38 and up to about 48 gallons per minute discharged horizontally from the outlet at a density of at least 0.15 and up to about 0.20 gallons per minute per square feet over the extended-coverage area.

50. (Currently Amended) A fire protection system for a structure, the structure having an area to be protected, the area being disposed generally on a first plane and at least one wall disposed generally on a second plane, which is generally perpendicular to the area, the system comprising:

at least one pipe in communication with a fluid supply; and

at least one sprinkler being coupled to the at least one pipe and projecting from the at least one wall toward a boundary of the area to be protected, the at least one sprinkler including:

a generally tubular body with a passageway disposed along an axis, one end of the passageway forming an outlet at one end of the tubular body, the tubular body having a K factor greater than 9 and up to about 14, where the K factor represents a flow of fluid in gallons per minute through the passageway divided by the square root of the pressure of fluid fed to the generally tubular body in pounds per square inch gauge; and

a deflector being symmetrical about an imaginary vertical plane and divided by an imaginary horizontal plane that is orthogonal to the vertical plane, the axis defining the intersection between the vertical and horizontal planes, the deflector being coupled to the tubular body and spaced from the outlet, the deflector having a first arm, a second arm and a face portion oriented generally perpendicularly with respect to the axis [[and]], the face portion having an opening consisting of a circular opening coupled to the body to support the face portion spaced from the outlet, the face portion having an upper edge located above the horizontal plane and a lower edge located below the horizontal plane extending parallel to the horizontal plane and perpendicular to the vertical plane, the face portion having a bottom center extending below the horizontal plane centrally axially aligned with the circular opening along the vertical plane so as to locate the lower edge as a portion of the deflector most remotely below the horizontal plane.

the deflector further including a canopy portion supported by the first and second arms oriented generally parallel to the axis spaced from the upper edge to define a single opening of the deflector for water to pass through, the canopy portion having a free end defining a linear profile extending the entire length between the first and second arms parallel to the horizontal plane, the canopy portion having a fluid deflecting surface portion furthest from the axis above the outlet, the fluid deflecting surface portion consisting of a generally flat planar surface rectangular in cross-section, and when the sidewall fire sprinkler is paired with an identical sidewall fire sprinkler mounted approximately sixteen feet apart on a generally planar wall surface with a collection area of approximately sixteen feet between the sprinklers and sixteen feet away from one of the sprinklers, the collection area located at either one of a distance of about thirty-six inches and a distance of approximately six feet and 7.5 inches below each of the sidewall fire sprinklers so that water is delivered to the collection area at an average density of about 0.15 gallons per minute per square feet.

51. (Previously Presented) The system according to claim 50, wherein the structure including a ceiling disposed generally on a third plane parallel to the first plane, and the at least one sprinkler including two sprinklers mounted on the at least one wall and spaced apart from the axis of the body by a distance of at least approximately 10 feet, the canopy portion of each deflector of the sprinklers being spaced at least about 4.5 inches from the ceiling, and the face portion of the deflector being spaced at least about 4 inches from a surface of the wall.

52. (Previously Presented) The system according to claim 50, wherein the body further including at least one frame arm being coupled to the generally tubular body and the deflector so that the at least one frame arm is spaced from the outlet along the axis, the at least one frame arm

being located on a horizontal plane, which is generally parallel to the first plane and intersecting the axis.

53. (Previously Presented) The system according to claim 50, wherein the canopy portion further including a portion being coupled to the face portion by the first and second arms defining a single opening therebetween.

54. (Previously Presented) The system according to claim 50, wherein the deflector transforms water being discharged from the outlet at a rate of at least 38 gallons per minute, upon release of a closure which occludes the passageway until actuation of a trigger, at a density of at least 0.15 gallons per minute per square feet over the area to be protected.

55. (Withdrawn) A fire protection system for an area to be protected, the area being disposed generally on a first plane, the system comprising:

means for distributing fluid upon actuation of a heat responsive trigger at a flow rate of at least 38 gallons per minute from a sprinkler with a K-factor greater than 9, and at density of at least 0.15 gallons per minute per square feet over the area to be protected; and

at least one pipe being located above a boundary of the area to be protected, the pipe being in communication with a fluid supply.

56. (Withdrawn) The system of claim 55, wherein the flow rate including a flow rate of 48 gallons per minute or greater at a density of 0.20 gallons per minute per square feet over the area to be protected.

57. (Withdrawn) A fire protection method, comprising:

locating a generally tubular body proximate a fluid deflecting structure, the body having an inlet, a passageway and an outlet, the inlet being fed with water at a flow rate in gallons per minute divided by a square root of the water pressure fed to the inlet in pounds per square inch gauge for a magnitude thereof at generally greater than 9, the fluid deflecting structure being located next to and above an area to be protected, the area having a length and a width, each of the length and the width being greater than 10 feet; and

providing a water supply to the fluid deflecting structure so that at least 38 gallons per minute are dispersed over the area to be protected at a density of at least 0.15 gallons per minute per square feet.

58. (Withdrawn) The method of claim 57, wherein the providing includes supplying water so that 48 gallons per minute or greater are dispersed over the area to be protected at a density of 0.20 gallons per minute per square feet or greater.

59. (Withdrawn) A method of providing fire protection for an area to be protected, the method comprising:

locating a sprinkler with at least a K factor of 9 adjacent the boundary of an area greater than 100 square feet, where the K factor represents a flow of fluid in gallons per minute through the sprinkler divided by the square root of the pressure of fluid fed to the generally tubular body in pounds per square inch gauge; and

providing a water supply to the sprinkler, so that when the sprinkler is actuated, water is distributed over the area at a density of at least 0.15 gallons per minute per square feet.

60. (Withdrawn) The method of claim 59, wherein the providing further includes supplying water at a flow rate of 48 gallons per minute to be distributed over the area to be protected of about 256 square feet or greater.

61. (Withdrawn) The method of claim 60, wherein the providing includes supplying water to be distributed at a density of 0.20 gallons per minute per square feet over the area to be protected of about 320 square feet or greater.

62. (Previously Presented) The sprinkler of claim 1, wherein the canopy portion comprises a surface distal to the central axis, the distal surface consisting of a generally flat surface parallel to the central axis.

63. (Currently Amended) An extended coverage sidewall automatic fire sprinkler comprising:
a generally tubular body with a central passageway and a central axis, one end of the passageway forming an outlet at one end of the tubular body,
a frame arm being coupled to the one end of the generally tubular body;
a closure proximate the one end of the generally tubular body;
a liquid-filled glass bulb positioned to releasably retain the closure at the outlet closing the passageway; and

a deflector being symmetrical about an imaginary vertical plane and divided by an imaginary horizontal plane that is orthogonal to the vertical plane, the central axis defining the intersection between the vertical and horizontal planes, the deflector assembly being coupled to the generally tubular body by the frame arm, the deflector facing and spaced axially away from the outlet and intersecting the central axis, the tubular body having a K factor greater than 9, the

deflector having a first arm, a second arm and a generally planar face portion generally orthogonal to the central axis [[and]] , the face portion having an opening consisting of a circular opening engaged with the frame arm to support the face portion spaced from the outlet, the face portion having an upper edge located above the horizontal plane and a lower edge located below the horizontal plane extending parallel to the horizontal plane and perpendicular to the vertical plane, the face portion having a bottom center extending below the horizontal plane centrally axially aligned with the circular opening along the vertical plane so as to locate the lower edge as a portion of the deflector most remotely below the horizontal plane, the deflector further including a canopy portion being spaced from the upper edge and coupled to the face portion by the first and second arms so as to define a single opening of the deflector for water to pass through, the canopy portion further including [[at]] a first canopy end and extending generally along the central axis away from the outlet towards a free end, the first canopy end being spaced at a first distance from the outlet, the free end defining a linear profile extending the entire length from the first arm to the second arm parallel to the horizontal plane and spaced from the outlet at a second distance greater than the first distance, and the deflector being shaped and positioned so that upon release of the closure by the trigger, the deflector to transforms water discharged horizontally from the outlet into a spray pattern of water droplets dispersed over a generally horizontal, generally rectangularly-shaped extended coverage area of more than one hundred square feet located on one side of the sprinkler effective to control an ordinary hazard fire in the coverage area, and when the sidewall fire sprinkler is paired with an identical sidewall fire sprinkler mounted approximately sixteen feet apart on a generally planar wall surface with a collection area of approximately sixteen feet between the sprinklers and sixteen feet away from one of the sprinklers, the collection area located at either one of a distance of about thirty-six

inches and a distance of approximately six feet and 7.5 inches below each of the sidewall fire sprinklers so that water is delivered to the collection area at an average density of about 0.15 gallons per minute per square foot.

64. (Previously Presented) An extended coverage sidewall automatic fire sprinkler comprising:

- a generally tubular body with a central passageway and a central axis, one end of the passageway forming an outlet at one end of the tubular body, the tubular body having a K factor greater than 9;

- a closure at the one end of the tubular body at least generally closing the passageway;

- a trigger positioned to releasably retain the closure at the outlet generally closing the passageway; and

- means for dispersing water discharged horizontally from the outlet into a spray pattern of water droplets over a generally horizontal, generally rectangularly-shaped extended coverage area of more than one hundred square feet located on one side of the sprinkler effective to control an ordinary hazard fire in the coverage area and at an average density of about 0.15 gallons per minute per square foot when the sidewall fire sprinkler is paired with an identical sidewall fire sprinkler mounted approximately sixteen feet apart on a generally planar wall surface, the collection area being approximately sixteen feet between the sprinklers and sixteen feet away from one of the sprinklers, the collection area being located at either one of a distance of about thirty-six inches and a distance of approximately six feet and 7.5 inches below each of the sidewall fire sprinklers.

65. (Currently Amended) The sprinkler of claim 64, wherein the means for ~~transforming and delivering~~ dispensing includes a deflector at a discharge end of the sprinkler, the deflector being coupled with the tubular body facing and spaced axially away from the outlet and intersecting the central axis, the deflector having a face portion generally orthogonal to the central axis and a canopy portion being coupled to the face portion at a first canopy end and extending generally along the central axis away from the outlet towards a free end, the first canopy end being spaced at a first distance from the outlet, the free end being spaced from the outlet at a second distance greater than the first distance.

66. (Currently Amended) The sprinkler of claim 64, wherein the means for ~~transforming and delivering~~ dispensing includes a deflector at a discharge end of the sprinkler, the deflector being coupled with the tubular body facing and spaced axially away from the outlet so as to intersect the central axis, the deflector having a face portion oriented generally perpendicularly with respect to the central axis and located on one lateral side of the central axis and a canopy portion oriented generally parallel to the central axis and being located on another lateral side of the central axis opposite the one lateral side, the canopy portion being coupled to the face portion at a first canopy end and extending generally along the axis away from the outlet towards a free end, the first canopy end being spaced at a first distance from the outlet, the free end being spaced from the outlet at a second distance greater than the first distance, the deflector further being configured, with the sprinkler in a normal operating orientation with the central axis generally horizontal and the canopy portion generally centered over the face portion.

67. (Currently Amended) The sprinkler of claim 64, wherein the means for ~~transforming and delivering~~ dispensing includes two frame arms coupled to the generally tubular body proximate

the outlet, the two frame arms being located on a plane which intersects the central axis and a deflector being coupled with the tubular body by the two frame arms along the central axis and spaced axially away from the outlet and intersecting the central axis, wherein the deflector consisting of a single flow opening, includes a face portion oriented generally perpendicular with respect to the central axis, a canopy portion oriented generally parallel to the central axis, the canopy portion having a generally flat planar surface substantially parallel to the plane on which the frame arms are located, the deflector further including two support arms coupling the canopy and the face portion to define the single flow opening through the deflector.

68. (Currently Amended) The sprinkler of claim 64, wherein the means for ~~transforming and delivering~~ dispersing includes a deflector at a discharge end of the sprinkler, the deflector being coupled with the tubular body facing and spaced axially away from the outlet and intersecting the central axis, the deflector including a face portion oriented generally perpendicular with respect to the axis and a canopy portion oriented generally parallel to the axis, the canopy portion having a surface distal to the outlet consisting of a generally flat surface generally perpendicular to a plane passing through the axis.

69. (Currently Amended) The sprinkler of claim 64, wherein the means for ~~transforming and delivering~~ dispersing includes a deflector at a discharge end of the sprinkler, the deflector being coupled with the tubular body facing and spaced axially away from the outlet and intersecting the central axis, the deflector having a face portion generally orthogonal to the axis and a canopy portion being coupled to the face portion at a first canopy end and extending generally along the axis away from the outlet towards a free end, the first canopy end being spaced at a first distance

from the outlet, the free end being spaced from the outlet at a second distance greater than the first distance.

70. (Currently Amended) The sprinkler of claim 64, wherein the means for ~~transforming and delivering~~ dispersing includes a frame arm being coupled to the end of the generally tubular body, the frame arm being located generally on a horizontal plane, which is generally parallel to an area to be protected; and

a deflector assembly having a face portion generally orthogonal to the axis and a canopy portion being coupled to a face portion at a first canopy end and extending generally along the axis away from the outlet towards a free end, the first canopy end being spaced at a first distance from the outlet, the free end being spaced from the outlet at a second distance greater than the first distance, the deflector assembly being coupled to the generally tubular body by the frame arm so as to be spaced from the outlet along the axis so that when the heat responsive trigger is actuated, the closure is positioned to allow a flow of fluid to issue horizontally from the outlet of the generally tubular body over the extended-coverage area.

71. (Currently Amended) The sprinkler of claim 64, wherein the means for ~~transforming and delivering~~ dispersing includes a frame arm being coupled to the end of the generally tubular body, the frame arm being located generally on a horizontal plane, which is generally parallel to an area to be protected; and

a deflector assembly being coupled to the generally tubular body by the frame arm so as to be spaced from the outlet along the axis so that when the heat responsive trigger is actuated, the closure is positioned to allow a flow of fluid to issue horizontally from the outlet of the generally tubular body over the extended-coverage area, the deflector having a face portion

extending generally orthogonal to the axis and a canopy portion having a surface distal to the outlet and generally parallel to the longitudinal axis above an area to be protected, the distal surface consisting of a generally flat surface generally perpendicular to a plane passing through the longitudinal axis, the canopy portion being coupled to the face portion by only two support arms.

72. (Currently Amended) The sprinkler of claim 64, wherein the means for ~~transforming and delivering~~ dispensing includes a deflector at a discharge end of the sprinkler, the deflector being coupled with the tubular body facing and spaced axially away from the outlet and intersecting the central axis, the deflector consisting of a single flow opening and having a face portion extending generally orthogonal to the axis, a canopy portion being coupled to the face portion by only two support arms defining the single flow opening therebetween.

73. (Currently Amended) The sprinkler of claim 64, wherein the means for ~~transforming and delivering~~ dispensing includes a deflector at a discharge end of the sprinkler, the deflector being coupled with the tubular body facing and spaced axially away from the outlet and intersecting the central axis, the deflector consisting of a single flow opening and having a face portion extending generally orthogonal to the axis and a canopy portion, the canopy portion being coupled to the face portion by only two support arms symmetrical to the axis, the two support arms defining the single flow opening having a distance of about 1.5 inches between proximal surfaces of each support arm.

74. (Currently Amended) The sprinkler of claim 64, wherein the means for ~~transforming and delivering~~ dispensing includes a frame arm being coupled to the one end of the generally tubular

body and a deflector at a discharge end of the sprinkler, the deflector being coupled with the tubular body facing and spaced axially away from the outlet and intersecting the central axis, the deflector having a face portion generally orthogonal to the central axis and a canopy portion being coupled to the face portion at a first canopy end and extending generally along the central axis away from the outlet towards a free end, the first canopy end being spaced at a first distance from the outlet, the free end being spaced from the outlet at a second distance greater than the first distance.